335* Prevalence of cystic fibrosis-related diabetes (CFRD) and its microvascular complications in an adult CF population

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Introduction: Annual review including an oral glucose tolerance test (OGTT) for CFRD and impaired glucose tolerance (IGT) was introduced at our centre in 2005 (WHO criteria). We have a referral pathway and a joint CF/DM clinic and with increasing recognition of microvascular complications all CFRD patients are now also offered annual retinal screening and a spot albumin/creatinine ratio (ACR), with the following results.
Results: 62/176 (35%) have CFRD (58%F, 42%M), 22/176 (13%) have IGT. Of the CFRD patients 44 (71%) are on treatment (38 on insulin and 6 on oral hypoglycaemics) and 18 (29%) remain under observation.
The mean±SD age of CFRD patients on treatment is 28 yrs ±7.6, (range 16–48) and mean±SD HbA1c 7.9%±2.4 (range 4.3–13.9). Of this selected population, 32 (73%) attended retinal screening, with complications in 50%, including mild diabetic retinopathy (DR) in 6 (19%), moderate DR in 7 (22%) and pre-proliferative DR in 2 (6%), one subsequently required laser treatment for diabetic maculopathy. 2 patients also had early cataracts and 4 had evidence of drusen. Those with the most severe diabetic eye disease also had the longest duration of diabetes i.e >20 yrs for preproliferative, 10 yrs for moderate and <5 yrs for mild or no DR.
Of the CFRD patients on treatment 35 (80%) had an ACR, 11 (31%) were consistent with microalbuminuria. Renal impairment was also common in this group but all had been exposed to regular IV aminoglycosides. There was no evidence of macrovascular complications in our CFRD patients.
Conclusion: Retinopathy was common in our CFRD population and warrants regular review whereas the contribution of CFRD and nephrotoxic therapies to renal impairment remains to be defined.

336* Impaired glucose metabolism in patients with CF during acute exacerbations

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Background: The development of diabetes in patients with CF has been associated with a decline in their overall clinical and pulmonary function. Patients with CF and normoglycemia (CF-NG) have higher but still normal glucose levels in the Oral Glucose Tolerance Test (OGTT).
Objectives: To analyze the glucose metabolism and its association with pulmonary function in CF-NG patients specifically during exacerbations
Methods: CF-NG patients underwent an OGTT and intravenous glucose tolerance test (IVGTT) during exacerbation and 3–4 weeks after complete resolution.
Results: Of the 10 recruited patients 2 were diabetic by OGTT and were excluded. All 8 remaining patients displayed diabetic glucose tolerance with glucose levels of 233±8 mg/dl and 262±11 mg/dl at 90 and 120 min during exacerbation compared with normal levels of 154±21 mg/dl, 126±20 mg/dl ($p < 0.002$) measured during remission. IVGTT exemplified higher insulin release during exacerbation compared with remission (min 3; 305±80pmol/l vs 216±40pmol/l). When studying the ratio between glucose levels during exacerbation (using the area under the curve [AUC] of OGTT) and insulin secretion capacity (AUC of 1+3 min insulin in IVGTT) a negative correlation was found ($r = -0.64$, $p = 0.09$). Furthermore, we observed a significant negative correlation between FEV1 during remission and glucose levels at 2 hours after OGTT during exacerbation ($r = -0.88$, $p = 0.002$).
Conclusion: During exacerbation CF-NG patients exhibit early glucose intolerance. A higher release of first phase insulin suggests insulin resistance, but the failure to normalize glucose in OGTT implies also an insulin secretion defect. Based on our results the benefit of administration of insulin in non-diabetic patients during acute exacerbations should be considered.

337 Can patients at risk of cystic fibrosis-related diabetes be identified early?

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Background: Identifying cystic fibrosis-related diabetes (CFRD) early is important to prevent decline in patients' physical health.
Purpose: The purpose of this analysis was to test a screening tool to identify patients at most risk of developing CFRD.
Methods: The screening tool (CFRDv1) included 27 items based on clinical experience and literature, and was completed at annual reviews. Data were entered into an SPSS database. Retrospective evaluation compared patients with normal and abnormal oral glucose tolerance test (OGTT) results in 2005 ($n = 37$), 2006 ($n = 45$), and both years ($n = 26$). Abnormal OGTT was defined as a two-hour result >7.8 mmol/L.
Results: The sample's mean age was 28 + 8 years, and 47% were female. No differences in OGTT were found by age, gender, BMI < 20 kg/m^2, unintentional weight loss, sputum organism, increased IV requirements, enteral feeds, increased glycated haemoglobin (HbA1c), use of itraconazole or megace, or symptoms of hyper/hypoglycaemia. Factors that were significantly different between patients with normal and abnormal OGTT in one or both years were previous abnormal OGTT, intermittent steroid use, and liver disease. Strong trends were found for difficulty maintaining/gaining weight and >5% decline in spirometry.
Conclusions: Certain factors are associated with presence of an abnormal OGTT and may indicate patients at highest risk for CFRD. The screening tool has been revised (CFRDv2) to reflect these findings, which also takes into consideration more recent relevant literature regarding fibrinogen, gamma-glutamyl transferase (GGT), and CF complications as predictive factors. It will be evaluated prospectively over the coming year.

338 Investigating suspected CF-related diabetes mellitus utilising serial capillary blood glucose profiling

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Introduction: Prompt diagnosis of CF related diabetes (CFRD) is important to prevent clinical deterioration. Oral Glucose Tolerance Testing (OGTT) has been considered the standard screening investigation for CFRD.OGTT diagnostic parameters for Types 1and 2 diabetes may be inappropriate for investigating CFRD. We report our experience using serial capillary blood glucose profiling (SCBGP) as a possible alternative to OGTT and Continuous Glucose Monitoring (CGMS) in CFRD screening.
Method: Large numbers of adolescents with CF attending RHSC, Glasgow were found to have increases in their 30-, 60- and 90-minute blood glucose values, without fasting or 120-minute values diagnostic of Impaired Glucose Tolerance (IGT) or Diabetes mellitus (DM). We augmented the OGTT, using serial capillary blood glucose profile (SCBGP) over a 24-hour period, samples being obtained immediately before and one hour after meals, before bed and at 3am. Patients on enteral feeds have additional samples pre-, mid- and post-feeds.
Results: Of 27 patients who have undergone SCBGP, two did not undergo OGTT, one of these preferring SCBGP to assess glucose metabolism. All other patients had non-diabetic OGTTs.15 children were found to have at least one elevated (>11.1 mmol/l) SCBGP result. Insulin therapy was clinically beneficial in 3 patients where recurrently high random SCBGP results were seen in repeated profiles. In one patient, SCBGP demonstrated dietary modification alone was sufficient to resolve hyperglycaemia.
Discussion: SCBGP profiling has advantages over OGTT and CGMS, including cost, ease of use and acceptability and may play a valuable role in screening CF patients for impaired glucose metabolism.